Characterization of mechanisms regulating de-differentiation and the re-acquisition of stem cell identity

Grant Award Details

Characterization of mechanisms regulating de-differentiation and the re-acquisition of stem cell identity

Grant Type: New Faculty I

Grant Number: RN1-00544-A

Project Objective: The overall goal of this grant is to characterize mechanisms regulating stem cells and their niches in Drosophila testes and intestine, and to elucidate the function of human IMP genes in human pluripotent stem cells.

Investigator:

Name:	Dana Jones
Institution:	Salk Institute for Biological Studies
Type:	PI

Human Stem Cell Use: Embryonic Stem Cell

Award Value: $2,134,100

Status: Closed

Progress Reports

Reporting Period: Year 2

View Report

Reporting Period: Year 3

View Report

Reporting Period: Year 4

View Report

Grant Application Details

Application Title:	Characterization of mechanisms regulating de-differentiation and the re-acquisition of stem cell identity
Public Abstract:	Stem cells are the building blocks during development of organisms as varied as plants and humans. In addition, adult or “tissue” stem cells provide for the maintenance and regeneration of tissues, such as blood and skin throughout the lifetime of an individual. The ability of stem cells to contribute to these processes depends on their unique ability to divide and generate both new stem cells (self-renewal) as well as specialized cell types (differentiation). In some tissues, cells that have already begun to specialize can revert or “de-differentiate” and assume stem cell properties, including the ability to self-renew. De-differentiation of specialized cells could provide a “reservoir” of cells that could act to replace stem cells lost due to wounding or aging. This proposal seeks to uncover the mechanisms that are utilized to regulate the process of de-differentiation and to compare these to the mechanisms that endow stem cells with the ability to self-renew. A thorough understanding of the factors that regulate self-renewal programs will be essential for the expansion and long-term maintenance of adult stem cells in culture, a necessary step towards the successful use of stem cells in regenerative medicine and tissue replacement therapies. Furthermore, understanding the mechanisms by which partially differentiated cells can reacquire self-renewal potential and how these programs are utilized during the normal course of tissue maintenance and repair could provide powerful strategies for regenerative medicine by stimulating inherent self-repair programs normally present within tissues and organs.
Statement of Benefit to California:	We plan to identify and characterize genes and proteins that are involved in regulating the ability of specialized cell types to revert back into a more immature cell that can act like a stem cell. Information revealed by these experiments will likely prove useful in understanding both how tissues can be maintained during aging and/or repaired after damage. Subsequently, this knowledge could be developed into powerful strategies for regenerative medicine by stimulating inherent self-repair programs normally present within tissues and organs. In addition, these experiments may provide some insight into how some tumors may be initiated, leading to cancer. Lastly, in the course of these studies, we will be generating ES cell-like cells from spermatogonial stem cells. Although we will initially work with mouse tissues, our ultimate goal would be to adapt these techniques to human spermatogonial stem cells, which would then be used as a source for generating human ES cells. We would make these cells readily available to other investigators and companies in hopes of accelerating the pace of discovery.